

## 18.310 Exam #1: Take Home Part

Problem 1. 10 points

Find a primitive polynomial  $p(x)$  of degree 6 which is not  $1 + x + x^6$ , and construct its remainder table.

Problem 2. 10 points

Find the polynomial  $p_3(x)$  associated with the polynomial you chose in problem 1.

Problem 3. 40 points

Construct an encoder and decoder spreadsheet for the two-error-correcting BCH code associated with this polynomial. It should:

- a. Have a place to enter the appropriate length message.
- b. Create an encoded message from it.
- c. Allow introduction of errors.
- d. Compute  $t_1$  and  $t_3$  from the encoded message by using the appropriate remainder tables.
- e. Compute the error locator polynomial from  $t_1$  and  $t_3$  and the appropriate tables.
- f. Compute the locations of the errors and correct up to two errors.
- g. Find the original message by dividing the corrected message by the encoding polynomial.